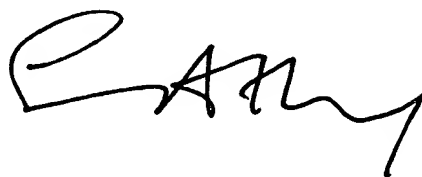


UNITED STATES PATENT AND TRADEMARK OFFICE

I, Susan ANTHONY BA, ACIS,

Director of RWS Group plc, of Europa House, Marsham Way, Gerrards Cross,
Buckinghamshire, England declare;

1. That I am a citizen of the United Kingdom of Great Britain and Northern Ireland.
2. That the translator responsible for the attached translation is well acquainted with the German and English languages.
3. That the attached is, to the best of RWS Group plc knowledge and belief, a true translation into the English language of the accompanying copy of the specification filed with the application for a patent in Germany on 3 December 1996 under the number 196 49 954.2 and the official certificate attached hereto.
4. That I believe that all statements made herein of my own knowledge are true and that all statements made on information and belief are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application in the United States of America or any patent issuing thereon.



For and on behalf of RWS Group plc
The 14th day of March 2003

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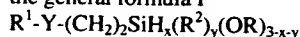
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The following details have been taken from the documents submitted by the Applicant

54 Fluoroalkyl-functional organosiloxane-containing compositions based on alcohol, a process for their preparation and their use

57 The present invention relates to fluoroalkyl-functional organosiloxane-containing compositions based on alcohol which are obtainable by controlled hydrolysis of at least one fluoroalkyl-functional organosilane of the general formula I

in which R^1 is a mono-, oligo- or perfluorinated alkyl group having 1 to 9 C atoms or a mono-, oligo- or perfluorinated aryl group, Y is a CH_2 , O or S group, R^2 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,

at a temperature in the range between 0 and 120°C over a period of 0.5 to 24 hours and with good thorough mixing in an alcoholic medium which, in addition to water, comprises a weak mono- or polybasic acid or a weak base or a weak mono- or polybasic acid and a weak base or an acid or basic salt, the water employed and the alkoxysilane employed being in a molar ratio of 2 to 500:1.

The invention furthermore relates to a process for their preparation and their use.

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Description

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The invention relates to fluoroalkyl-functional organopolysiloxane-containing compositions based on alcohol, to a process for their preparation and to their use.

- 10 Organosilanes of the general formula $R'-Si(R'')_3$, where R' is a fluorinated organic radical and R'' is a chlorine or methoxy or ethoxy radical, have diverse uses, for example for application of hydrophobically and oleophobically acting layers on surfaces. Such coatings
15 and impregnations can be produced on the corresponding workpiece via, for example, dipping, impregnating, spraying or rolling operations.

It is also known that oil- and water-repellent coatings
20 of surfaces, usually glass surfaces, are produced with the aid of fluoroalkylalkoxysilanes. The coatings can be used, for example, as a dirt-repellent treatment on plate glass. The processes described are based on sol-gel processes, very fine inorganic particles being
25 produced and employed together with the fluoroalkylalkoxysilane. Application of such systems is technically demanding, and usually uses complex organic solvent mixtures and additives. Moreover, such systems comprise chlorine and furthermore only remain fit to use
30 for a relatively short period of time (European Laid-Open Specification 0 658 525, European Laid-Open Specification 0 629 673 and US 5 424 130).

Since the processes mentioned are based on sol-gel
35 processes which are demanding both in their use and economically, their commercial utilization has to date been limited to niche areas. Furthermore, there are narrow time limits in respect of the processability and

therefore the subsequent efficacy of such fluoroalkyl-silane-containing formulations on a substrate surface, and these likewise have an adverse effect on broader use in practice. In addition to partial to complete loss of
5 the adhesive action, a slow phase separation up to laminar deposition of a fluoroalkylsilane-containing phase can occur.

The complicated application processes and, moreover,
10 also the use of solvents such as fluorinated hydrocarbons or fluorohydrocarbons, therefore are disadvantages of such processes (European Laid-Open Specification 0 491 251, European Laid-Open Specification 0 493 747).

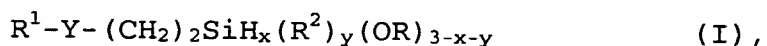
15 In the case of the known solvent-based systems, it is furthermore to be noted that although some systems are stable in the long term in the non-hydrolyzed state, they are distinguished by an efficacy limited to a
20 maximum of a few days in the hydrolyzed form because of the progressive polycondensation of the silanol functions. As a result of a continuous reduction in the content of silanol groups, the proportion of possible chemical bonding to a substrate surface is furthermore
25 reduced, this subsequently manifesting itself in unsatisfactory adhesion of the coating to the substrate surface.

There was therefore the object of providing silane-based
30 systems which can be prepared in a simple and economical manner and are essentially free from chlorine, furthermore have adequate stability over a relatively long period of time, and with which a simultaneously hydrophobic and also oleophobic layer can be produced on
35 substrate surfaces in an impregnation process which is easy to carry out.

The object described is achieved according to the inven-

tion in accordance with the statements of the patent claims.

It has been found, surprisingly, that organosiloxane-
5 containing compositions based on alcohol which contain
Si-bonded fluoroalkyl functions are accessible in a
simple and economical manner as chlorine-free,
homogeneous, clear solutions which are stable for
several months if at least one fluoroalkyl-functional
10 organosilane of the general formula I



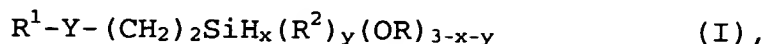
15 in which R^1 is a mono-, oligo- or perfluorinated
alkyl group having 1 to 9 C atoms
or a mono-, oligo- or perfluorinated aryl group, Y
is a CH_2 , O or S group, R^2 is a linear, branched or
cyclic alkyl group having 1 to 8 C atoms or an aryl
group and R is a linear, branched or cyclic alkyl
20 group having 1 to 8 C atoms or an aryl group and
 $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,

is hydrolyzed in a controlled manner, with good thorough
mixing, in an alcoholic medium which, in addition to
25 water, comprises a weak mono- or polybasic acid or a
weak base or a weak mono- or polybasic acid and a weak
base or an acid or basic salt, at a temperature in the
range between 0 and $120^\circ C$ and over a period of 0.5 to 24
hours, the water and the alkoxysilane according to
30 formula I being employed in a molar ratio of 2 to $500:1$.
The compositions according to the invention furthermore
can be employed for simultaneous hydrophobization and
oleophobization of substrate surfaces in a simple manner
with an outstanding action.

35

The present invention therefore relates to a
fluoroalkyl-functional organosiloxane-containing
composition based on alcohol, which is obtainable by

controlled hydrolysis of at least one fluoroalkyl-functional organosilane of the general formula I



5

in which R^1 is a mono-, oligo- or perfluorinated alkyl group having 1 to 9 C atoms

10

or a mono-, oligo- or perfluorinated aryl group, Y is a CH_2 , O or S group, R^2 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,

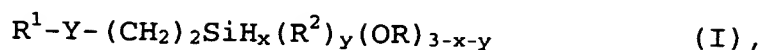
15 at a temperature in the range between 0 and 120°C over a period of 0.5 to 24 hours and with good thorough mixing in an alcoholic medium which, in addition to water, comprises a weak mono- or polybasic acid or a weak base or a weak mono- or polybasic acid and a weak base or an
20 acid or basic salt, the water employed and the alkoxysilane employed being in a molar ratio of 2 to 500:1.

25 Compositions according to the invention preferably have a pH of between 2 and 12, particularly preferably a pH of between 3 and 10, and suitably have a viscosity of less than 10,000 mPa.s. The content of alcohols in compositions according to the invention is preferably 40 to 99.999% by weight, based on the total composition,
30 the composition preferably comprising fluoroalkyl-functional organosiloxanes in amounts of 0.001 to 30% by weight, particularly preferably 0.01 to 5% by weight, and especially preferably 0.1 to 2% by weight, based on the composition.

35

The present invention furthermore relates to the process for the preparation of a fluoroalkyl-functional organosiloxane-containing composition, which comprises

subjecting at least one fluoroalkyl-functional organosilane of the general formula I



5

in which R^1 is a mono-, oligo- or perfluorinated alkyl group having 1 to 9 C atoms .

or a mono-, oligo- or perfluorinated aryl group,

10

Y is a CH_2 , O or S group, R^2 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,

15 to controlled hydrolysis with good thorough mixing, in an alcoholic medium which, in addition to water, comprises a weak mono- or polybasic acid or a weak base or a weak mono- or polybasic acid and a weak base or an acid or basic salt, at a temperature in the range
20 between 0 and 120°C and over a period of 0.5 to 24 hours, preferably 1 to 12 hours, particularly preferably over a period of 2 to 6 hours, the water and the alkoxysilane being employed in a molar ratio of 2 to 500:1.

25

In the process according to the invention, the fluoro-alkyl-functional organosilane of the general formula I is preferably metered in in portions with temporal interruptions. However, the metering operation can also
30 be carried out continuously with temporal interruptions, or the discontinuous and continuous procedures for the metering can be combined with one another in a suitable manner.

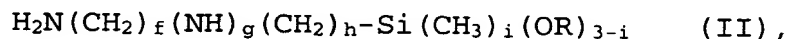
35

The reaction is in general carried out in a temperature range between 0 and 120°C, preferably in a temperature range between 10 and 80°C, particularly preferably between 20 and 60°C. The reaction is suitably carried

out with stirring.

In the process according to the invention, the pH of between 2 and 12 in the reaction medium is suitably established by employing a weak mono- or polybasic acid or a weak base or a weak mono- or polybasic acid and a weak base or an acid or basic salt.

The weak base employed in the process according to the invention is suitably an organosilane of the general formula II



in which $0 \leq f \leq 6$, $g=0$ if $f=0$ and $g=1$ if $f>1$, $0 \leq h \leq 6$, $0 \leq i \leq 1$ and

R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group,

aminopropyltriethoxysilane and aminopropyltrimethoxysilane and aminopropylmethyldiethoxysilane and aminopropylmethyldimethoxysilane being particularly preferred,

or an alkylamine of the general formula III



in which R^3 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or a linear, branched or cyclic aminoalkyl group having 1 to 8 C atoms or an aryl group, $z = 1, 2$ or 3 and groups R^3 are identical or different,

for example mono-, di- or trialkylamines, preferred alkyl groups being those having 1 to 3 C atoms.

Weak acids, such as formic acid, acetic acid, propionic

acid or citric acid, can also be employed in the process according to the invention. If weak acids and weak bases are employed simultaneously, it is not necessary in the process according to the invention to maintain an
5 equimolar ratio between acid and base.

In the process according to the invention, acid salts which can be employed are, for example, alkali metal hydrogen sulfate or dihydrogen phosphate or aluminum
10 acetate, or basic salts which can be employed are, for example, magnesium hydroxide or alkali metal acetate or alkali metal bicarbonate or alkali metal carbonate.

The reaction medium used in the process according to the
15 invention is preferably the alcohol corresponding to the alkoxy group of the organosilane employed; methanol, n-propanol, i-propanol, n-butanol, i-butanol, t-butanol and/or 2-methoxyethanol, but in particular ethanol, are suitably employed as the alcohol.

20 Linear perfluoroalkylalkoxysilanes are moreover preferred in the process according to the invention, such as, for example, perfluorododecyl-/perfluorodecyl-/perfluorooctyltrialkoxysilanes, in particular
25 perfluorooctyltriethoxysilane, and those fluoroalkyl-functional organosilanes which, according to formula I, contain $\text{CF}_3(\text{CF}_2)_7-$, $\text{CF}_3(\text{C}_6\text{H}_4)-$, C_6F_5- or $\text{R}^f\text{CH}_2\text{CH}_2(\text{C}=\text{O})-$, where $\text{R}^f = \text{C}_n\text{F}_{2n+1}$ and $n = 2$ to 18, as the group R, for example $\text{F}_{13}\text{C}_6(\text{CH}_2)_2\text{Si}(\text{OC}_2\text{H}_5)_3$, particular preference being
30 given to tridecafluoro-1,1,2,2-tetrahydrooctyl-trimethoxysilane and tridecafluoro-1,1,2,2-tetrahydrooctyltriethoxysilane and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,-10,10,10-heptafluoro-1,1,2,2-tetrahydrodecyl-triethoxysilane or corresponding mixtures.

35 Products prepared by the process according to the invention are stable and as a rule clear solutions. The compositions according to the invention can suitably be

diluted with alcohols in any ratio. A composition according to the invention can moreover comprise water in amounts of up to 5% by weight.

- 5 Fluoroalkyl-functional organosiloxanes obtained according to the invention preferably have a high concentration of silanol functions, on the basis of their oligomeric structure, which render them capable, in an outstanding manner, of reaction with substrate
- 10 surfaces containing hydroxyl groups. Coatings and impregnations with various substrates resulted in excellent oil- and simultaneously water-repellent properties - even after treatment with heat, surfactants and UV, cf. the examples. In appropriate studies on
- 15 various materials, it was furthermore shown that no reduction in efficacy or a [sic] destabilization of compositions according to the invention was detectable even after > 6 months.
- 20 The compositions according to the invention or prepared according to the invention are used with significant advantages over the products described in the introduction. Using the composition according to the invention, at the same time a hydrophobizing,
- 25 oleophobizing and dirt- and color-repellent action can be achieved in a simple and outstanding manner on the most diverse substrate substances, in particular on glass - for example plate glass, glass fibers, glass beads - fillers and pigments, metals, plastics, coatings
- 30 and paints, textile fibers, including cotton, wood, paper, mineral fibers and mineral building materials - for example lime sandstone, concrete, brick or ceramic. The compositions according to the invention can furthermore also be used as release agents, as
- 35 crosslinking agents, as adhesion promoters, in particular for fluorine polymers, such as, for example, Teflon or coatings based on fluorine polymers, and as additives for paints and coatings. Corresponding

processes for surface treatment using compositions according to the invention can in general be carried out with little industrial expenditure or expenditure on time.

5

The present invention therefore also relates to the use of the fluoroalkyl-functional organosiloxane-containing compositions based on alcohol according to the invention for simultaneous hydrophobizing and oleophobizing and
10 for dirt- and color-repellent treatment of surfaces, of plastics, of metals and of mineral building materials, for protecting buildings and facades, for coating glass fibers, for silanizing fillers and pigments, for improving the rheological properties of polymer dispersions
15 and emulsions, for hydrophobizing and oleophobizing and for dirt- and color-repellent treatment of textiles, leather and cellulose and starch products, and as release agents, as crosslinking agents, as adhesion promoters and as additives for paints and coatings.

20

The invention is illustrated in more detail by the following examples, without limiting the subject matter of the present invention:

25

Examples

Example 1

10 g of H_2O (0.56 mol) are mixed with 5 g of $HCOOH$ (pure: 0.11 mol) in a 250 ml glass beaker at room
30 temperature, while stirring, and 160 g of ethanol (3.5 mol) are then added, a pH of about 3.5-4 being established. Thereafter, 10 g of VPS 8261 (3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1,1,2,2-tetrahydrooctyltriethoxysilane) are added dropwise (0.02 mol)
35 and the mixture is subsequently stirred for 5 hours (no further change in pH). Thereafter, it is topped up to a total weight of 1000 g with 915 g of ethanol (19.9 mol). A clear, colorless solution which has a content of 1.0%

by weight of VPS 8261 and a storage stability of at least 6 months is obtained.

Comparison example

5 The procedure is as described in Example 1, but HCOOH is replaced by 1 molar HCl ($\text{pH} \leq 1$), a milky clouding thus starting after 48 to 72 hours, and thereafter a significant phase separation taking place within 2 weeks. After this period, the composition now appears only slightly
10 cloudy, but with a translucent, waxy layer which settles on the base and walls of containers of both glass and plastic.

Example 2

15 10 g of H_2O (0.56 mol) are mixed with 4.0 g of CH_3COOH (pure: 0.09 mol) in a 250 ml glass beaker at room temperature, while stirring, and 2.0 g (pure; 0.03 mol) of isobutylamine are added, a pH of 4.5-5 being established. Thereafter, the mixture is topped up with 50 g
20 of ethanol (1.1 mol), 5 g of 3,3,4,4,5,6,6,7,7-,8,8,9,10,10,10-heptadecafluoro-1,1,2,2-tetrahydrodecyltriethoxysilane) [sic] are added dropwise (0.008 mol) and the mixture is subsequently stirred for 5 hours (no further change in pH). Thereafter, it is topped up
25 to a total weight of 500 g with 429 g of ethanol (94.4 mol).

A clear, colorless solution which has a content of 1.0% by weight of 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-1,1,2,2-tetrahydrodecyltriethoxysilane
30 and a storage stability of at least 6 months is obtained.

Example 3

25 g of H_2O (1.4 mol) are mixed with 5 g of HCOOH (pure:
35 0.11 mol) in a 250 ml glass beaker at room temperature, while stirring, 10 g of DYNASYLAN® 1203 (3-aminopropyltriethoxysilane) are added dropwise (0.07 mol) and 50 g of ethanol (1.1 mol) are then added. A pH of about 8.0

is established. Thereafter, 5 g of VPS 8261 (3,3,4,4,-
5,5,6,6,7,7,8,8,8-tridecafluoro-1,1,2,2-tetrahydro-
octyltriethoxysilane) (0.01 mol) are added dropwise and
the mixture is subsequently stirred for 5 hours (no
5 further change in pH). Thereafter, it is topped up to a
total weight of 750 g with 655 g of ethanol (8.8 mol).
A clear, colorless solution which has a content of 0.67%
by weight of VPS 8261 and a storage stability of at
least 4 months is obtained.

10

Example 4

15 g of DYNASYLAN® 1203 (3-aminopropyltriethoxysilane)
(0.045 mol) are mixed with 5 g of VPS 8261 (3,3,4,4,-
5,5,6,6,7,7,8,8,8-tridecafluoro-1,1,2,2-tetrahydrooctyl-
15 triethoxysilane) (0.07 mol) and 50 g of ethanol (1.1
mol) in a 250 ml glass beaker at room temperature.
Thereafter, 25 g of H₂O are added with continued
stirring. A pH of about 9-10 is established. The mixture
is subsequently stirred for a further 5 hours (no
20 further change in pH) and is then topped up to a total
weight of 500 g with 405 g of ethanol (8.8 mol).
A clear, colorless solution which has a content of 1.0%
by weight of VPS 8261 and a storage stability of at
least 4 months is obtained.

25

Example 5

Using the solutions of Examples 1 to 4, coatings were
produced on glass sheets, steel sheets, aluminum foils,
copper sheets, cardboards, paper and polyester and
30 impregnations were produced on cellulose, wood, leather
and cotton.

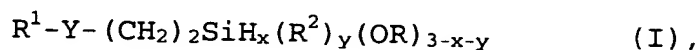
For this, the substrate specimens were immersed in the
ready-to-use solutions of Examples [lacuna] to 4 for
about 5 minutes and, after removal, the solvents were
35 removed at 120°C in a drying cabinet over a period of
about 30 minutes.

Thereafter, the substrate specimens showed significant
hydro- and oleophobic properties. This manifested

- itself, inter alia, by the following properties:
Beading effect of heating oil, silicone oil, water,
contact angle $> 100^\circ$, "anti-graffiti", "anti-soiling",
"anti-fouling". These properties are retained even after
5 storage for several months at room temperature, with
varying moisture contents and under the influence of
daylight.

Patent claims:

1. A fluoroalkyl-functional organosiloxane-containing composition based on alcohol,
5 obtainable by controlled hydrolysis of at least one fluoroalkyl-functional organosilane of the general formula I



- 10 in which R^1 is a mono-, oligo- or perfluorinated alkyl group having 1 to 9 C atoms or a mono-, oligo- or perfluorinated aryl group, Y is a CH_2 , O or S group, R^2 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an
15 aryl group and R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group and $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,
20 at a temperature in the range between 0 and $120^\circ C$ over a period of 0.5 to 24 hours and with good thorough mixing in an alcoholic medium which, in addition to water, comprises a weak mono- or poly-
25 basic acid or a weak base or a weak mono- or poly-basic acid and a weak base or an acid or basic salt, the water employed and the alkoxysilane employed being in a molar ratio of 2 to $500:1$.

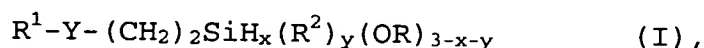
2. A composition as claimed in claim 1,
30 wherein this has a pH of between 2 and 12 .
3. A composition as claimed in claim 1 or 2,
wherein
35 the alcohol content in the composition is 40 to 99.999% by weight.
4. A composition as claimed in at least one of claims

1 to 3,
wherein
this is essentially free from chlorine.

5 5. A composition as claimed in at least one of claims
1 to 4,
wherein
this comprises fluoroalkyl-functional organosil-
oxanes in amounts of 0.001 to 30% by weight, based
10 on the composition.

6. A composition as claimed in at least one of claims
1 to 5,
wherein
15 this has a viscosity of less than 10,000 mPa·s.

7. A process for the preparation of a fluoroalkyl-
functional organosiloxane-containing composition as
claimed in at least one of claims 1 to 6,
20 which comprises
subjecting at least one fluoroalkyl-functional
organosilane of the general formula I



25 in which R^1 is a mono-, oligo- or perfluorinated
alkyl group having 1 to 9 C atoms
or a mono-, oligo- or perfluorinated aryl group,
Y is a CH_2 , O or S group, R^2 is a linear, branched
30 or cyclic alkyl group having 1 to 8 C atoms or an
aryl group and R is a linear, branched or cyclic
alkyl group having 1 to 8 C atoms or an aryl group
and $x = 0, 1$ or 2 and $y = 0, 1$ or 2 , where $(x+y) \leq 2$,
35 to controlled hydrolysis with good thorough mixing,
in an alcoholic medium which, in addition to water,
comprises a weak mono- or polybasic acid or a weak
base or a weak mono- or polybasic acid and a weak

base or an acid or basic salt, at a temperature in the range between 0 and 120°C and over a period of 0.5 to 24 hours, the water and the alcoxysilane being employed in a molar ratio of 2 to 500:1.

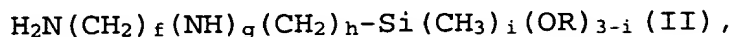
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8. The process as claimed in claim 7, wherein the pH in the reaction medium is adjusted to a value of between 2 and 12.

10

9. The process as claimed in claim 7 or 8, wherein an organosilane of the general formula II

15



in which $0 \leq f \leq 6$, $g=0$ if $f=0$ and $g=1$ if $f>1$, $0 \leq h \leq 6$, $0 \leq i \leq 1$ and

20

R is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or an aryl group,

or an alkylamine of the general formula III

25



30

in which R^3 is a linear, branched or cyclic alkyl group having 1 to 8 C atoms or a linear, branched or cyclic aminoalkyl group having 1 to 8 C atoms or an aryl group, $z = 1, 2$ or 3 and groups R^3 are identical or different, is employed as the weak base.

35

10. The process as claimed in at least one of claims 7 to 9, wherein formic acid, acetic acid, propionic acid or citric acid is employed as the weak acid.

11. The process as claimed in at least one of claims 7 to 10,
wherein
alkali metal hydrogen sulfate or dihydrogen
phosphate or aluminum acetate is employed as the
acid salt.
12. The process as claimed in at least one of claims 7 to 11,
wherein
magnesium hydroxide or alkali metal acetate or
alkali metal bicarbonate or alkali metal carbonate
is employed as the basic salt.
13. The process as claimed in at least one of claims 7 to 12,
wherein
the alcohol corresponding to the alkoxy group of
the organosiloxane employed is used.
14. The process as claimed in at least one of claims 7 to 13,
wherein
methanol, ethanol, n-propanol, i-propanol,
n-butanol, i-butanol, t-butanol and/or 2-methoxy-
ethanol are employed as the alcohol.
15. The use of a fluoroalkyl-functional organosiloxane-containing composition based on alcohol as claimed in claims 1 to 14 for simultaneous hydrophobizing and oleophobizing and for dirt- and color-repellent treatment of surfaces, of plastics, of metals and of mineral building materials, for protecting buildings and facades, for coating glass fibers, for silanizing fillers and pigments, for improving the rheological properties of polymer dispersions and emulsions, for hydrophobizing and oleophobizing and for dirt- and color-repellent treatment of

textiles, leather and cellulose and starch products, and as a release agent, as a crosslinking agent, as an adhesion promoter and as an additive for paints and coatings.